

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

[THIRD SERIES.]

No. 118. OCTOBER 1867.

XXIX.—*On the Classification of the Subdivisions of M'Coy's Genus Athyris, as determined by the laws of Zoological Nomenclature.* By E. BILLINGS, Palæontologist of the Geological Survey of Canada*.

[Read before the Nat. Hist. Soc., Montreal, March 25, 1867†.]

EVERY naturalist who has studied the palæozoic Brachiopoda is aware that there exists a very great diversity of opinion with regard to the classification of the several sections into which the old genus *Athyris* has been divided. The arrangement which I and some others have adopted is, in substance, the same as that proposed by Mr. Davidson in the first edition of his 'General Introduction,' published in 1853‡. Although this has been

* From 'Silliman's American Journal,' July 1867.

† After the reading of this paper, the subject was discussed by some of the members of the Society. The following is from a short report published in the newspapers at Montreal:—"After the paper was read, Dr. P. P. Carpenter said that he thought that Mr. Billings had clearly established his point, and gave an account of the history of a committee appointed by the British Association to make laws to regulate scientific nomenclature, of which committee he was a member. Mr. Whiteaves stated that he was satisfied with the correctness of the view Mr. Billings had taken, and made some remarks about scientific nomenclature and upon some structural points in the shells of the genus in question. Principal Dawson deplored the confusion that has arisen through conflicting views on the question of nomenclature, and, agreeing with Mr. Billings in the conclusion he had come to, said that this communication was valuable inasmuch as it cleared up a question that had hitherto been obscure."

‡ Modified by separating *Merista*, thus:—

Genus.	Type.
<i>Athyris</i> , M'Coy, 1844	<i>A. tumida</i> , Dalman.
<i>Spirigera</i> , D'Orbigny, 1847	<i>S. concentrica</i> , Von Buch.
<i>Merista</i> , Suess, 1851.....	<i>M. Herculea</i> , Barrande.

The recent classification differs from the above as follows:—

<i>Meristella</i> , Hall, 1860	<i>A. tumida</i> .
<i>Athyris</i> or <i>Spirigera</i>	<i>S. concentrica</i> .
<i>Merista</i>	<i>M. Herculea</i> .

According to this, either *Athyris* or *Spirigera* must be suppressed, in order to make room for *Meristella*.

objected to by several distinguished palæontologists, and in consequence thereof abandoned by its author, yet I believe that, on a careful examination of all the circumstances, it will be found to be perfectly just toward the parties concerned, and in no respect inconsistent with the rules of zoological nomenclature. It was the first subdivision of the genus published, and should therefore take precedence over all others.

Previously to 1853 *Athyris* was only known as a single large genus of Brachiopoda, which included such forms as *Terebratula concentrica*, Von Buch, *T. tumida*, Dalman, and *T. Herculea*, Barrande. In that year Mr. Davidson divided it into two smaller genera, confining the name *Athyris* to that section for which it was most appropriate, with *tumida* or *Herculea* for the type, and adopting *Spirigera*, D'Orbigny, for the other type, *T. concentrica*. It was afterwards found that *Athyris*, as then re-defined, included two genera; and in consequence it has been again divided by separating all those typified by *T. Herculea* under the name of *Merista*, a genus proposed but not clearly characterized by Prof. Suess in 1851. This is the classification which I believe to be the true one. While discussing it I shall, throughout this paper, when I may have occasion to refer to the species above named, designate them *Athyris tumida*, *Spirigera concentrica*, and *Merista Herculea*.

Those who are opposed to this arrangement contend that, as all the species which M'Coy placed in the genus at the time he first described it belong to the group typified by *S. concentrica*, the name *Athyris* must be retained for that group, and cannot now be transferred to the other section of which *A. tumida* is the type. This reasoning, according to my views, can only hold good in case it be first proved that M'Coy specially confined the genus to species having the generic characters of those in his original list, or pointed out one of them as the type, or drew up his diagnosis in such a manner as to exclude *A. tumida*. In this paper I shall endeavour to show—

1. That M'Coy did not limit his genus to the species first placed in it.

2. That, on the contrary, he and other naturalists understood it to include both *A. tumida* and *S. concentrica*.

3. That, according to the laws of zoological nomenclature, the subdivision made by Davidson in 1853 cannot be set aside.

4. That Davidson's classification has been adopted in several works, some of them of great influence and wide circulation.

In order to prove the above propositions, I shall give the more important facts of the history of the genus, with M'Coy's original figure, and shall quote some of the laws above mentioned in full. Much of this, of course, belongs to the common stock

of knowledge of all palæontologists conversant with the fossils of the older rocks, and might be thought superfluous. But the question is somewhat complicated, and cannot well be decided unless in view of all the circumstances. Besides this, it is one upon which any good naturalist is perfectly competent to give an opinion although specially engaged in other departments. Few of these have access to works on palæozoic fossils; and therefore, for the convenience of such as may feel inclined to investigate the subject, it is desirable to bring all the facts together.

There is no dispute about the extent of the genera; and therefore the details of the internal characters need not be given. It is purely a question of natural-history ethics, if I may be permitted to use such a term.

1. *History and Extent of the original Genus.*

The original description was published in the 'Synopsis of the Carboniferous Fossils of Ireland,' in 1844. From this work I shall make some extracts, and shall introduce along with the original figure two others to further illustrate the subject.

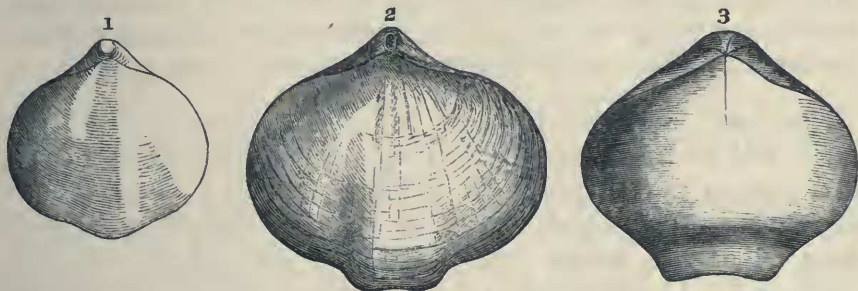


Fig. 1. Copy of the original figure given by M'Coy (without a specific name) to illustrate his idea of the general form of an *Athyris*.

Fig. 2. *Spirigera concentrica*, Von Buch. The form is copied from Davidson's Monograph of the British Devonian Brachiopoda, pl. 3. fig. 13, Pal. Soc. Mon. for 1862. The right-hand side is, in this copy, a little restored, and the aperture in the beak made larger than it is in the original figure.

Fig. 3. *Athyris tumida*, Dalman. Copied from Davidson's 'General Introduction,' pl. 6. fig. 73.

The following extracts are from M'Coy's work above referred to:—

"The family Delthyridæ appears to be divided into the five following genera:—1. *Spirifera*, Sow., composed of those longitudinally ribbed species in which the hinge-line is equal to, or exceeds, the width of the shell, the cardinal area with parallel sides, the cardinal teeth of the ventral valve [now called the dorsal valve] large, spirally rolled, and having a triangular foramen beneath the beak of the

dorsal [ventral] valve. 2. *Martinia*, M'Coy, or the smooth Spirifers, in which the hinge-line is less than the width of the shell, and the cardinal area triangular. 3. *Athyris*, M'Coy, in which there is no vestige of either foramen, cardinal area, or hinge-line. This remarkable genus is frequently confounded with those shells usually named *Terebratula* in the older rocks, but is distinguished by the large spiral appendages, which are wanting in the other group. 4. *Brachythyris*, M'Coy, in which we find the longitudinally ribbed surface of *Spirifera* united with the short hinge-line of *Martinia*. 5. *Orthis*, Dal., in which there are no spiral appendages, the hinge-line and striæ frequently spinose (as in *Leptæna*), the cardinal area common to both valves, and its sides inclined towards each other at its angles; dorsal valve smallest."—*Op. cit.* p. 128.

On page 146 of the same work he thus concisely describes the genus:—

"*Gen. Char.*—Nearly orbicular, small; no cardinal area or hinge-line; spiral appendages very large, filling the greater part of the shell.

"This very interesting group possesses all the external characters of the Terebratulidæ united to the internal structure of the Spirifers, to which latter family it truly belongs. Prof. Phillips is the only author who has recognized the group: he forms of it his last division of the genus *Spirifera*, but gives no characters to distinguish it from *Terebratula*; the internal structure is, however, a sure guide."

The above is all that he wrote about the genus at that time; and it will be perceived that he does not point out any particular species as the type, and, further, that there is nothing in his remarks from which it can be inferred that he knew anything about the genera into which the group was afterwards subdivided. Consequently it is impossible that he could have intended to confine the genus to any one of them, as is now affirmed by some of the naturalists who are opposed to the classification advocated in this paper. Instead of excluding species with an imperforate beak such as *A. tumida*, the etymology of the word *Athyris* (without a door or opening), the expression "in which there is no vestige of either foramen, cardinal area, or hinge-line," and also his typical figure, all induce the belief that he had before him one or more forms with the beak entire. This is rendered certain by what he says on page 147. Speaking of what he calls *A. concentrica*, he says:—"This species is not uncommon; it is figured in the 'Bull. de la Soc. Géol. de France,' with a perforated beak as in *Terebratula*. I have, however, seen numerous specimens with the beak entire and imperforate, as in the other palæozoic species." It is highly probable from all this that he had in view such Silurian forms as *A. tumida*. This latter species is so common that it is almost certain

that such a collection as he was then engaged upon would contain one or more specimens.

If we take the paragraph No. 3 as a part of the generic description, then *A. tumida* is included. If, on the other hand, we confine ourselves to the extract from page 146, it is not excluded, as there is no reference made there to the structure of the beak. This latter diagnosis is sufficiently comprehensive and general in its terms to include *Athyris*, *Spirigera*, and *Merista*. He did not place *A. tumida* in the genus, for the reason that his work was confined altogether to the Carboniferous fossils, among which it does not occur. But he did so afterwards, when he described Professor Sedgwick's Silurian fossils, as will be shown further on. He was wrong in supposing that all the species were imperforate—a matter of little consequence, as it was simply an error of observation, which does not vitiate. Had the genus turned out to be not capable of subdivision, all that could be done now with this error would be to strike it out. There was sufficient in his diagnosis to indicate what group of fossils was intended. He was also wrong in supposing *S. concentrica* to be a Carboniferous fossil: it is Devonian. It may be that he mistook some other species with an imperforate beak for that. It will be seen further on that Prof. King made a similar mistake with respect to this very species, having taken *T. scalprum*, Barrande, for it—an error which was detected by Mr. Davidson. Altogether he referred eleven species to the genus, several of which have been shown to be synonyms.

In the same work he proposed another genus, *Actinoconchus*; but as it was founded on error, he afterwards withdrew it, and added it to *Athyris* (Brit. Pal. Foss. p. 436). All scientific works abound more or less with such misconceptions.

That the genus was understood by other naturalists to include *A. tumida* is proved by the following facts. It is well known that the genus *Spirigera* was proposed by D'Orbigny, in 1847, simply as a substitute for *Athyris*, on the ground that this latter name implies the absence of a foramen, and is therefore not appropriate for species with a perforated beak. It is quite clear that D'Orbigny considered his genus to be precisely the same in extent as *Athyris*. All the species, therefore, which he placed in *Spirigera* he regarded as fairly within the group; and it is unquestionable that he would have referred them all to *Athyris* had not that name appeared to him objectionable. I have not seen his original description in the 'Annales des Sciences Naturelles,' referred to by Mr. Davidson in the extract given below; but in the 'Paléontologie Française,' vol. iv. p. 357, he says:—"This division has already two generic names which we cannot preserve, because they are in complete contra-

diction to zoological characters." The two genera referred to were *Athyris* and *Actinoconchus*.

He specially selected *T. concentrica** for the type of his genus; and therefore, if *Spirigera* be retained at all, it must be for that section. He refers to his 'Prodrome' for a list of the species; and we have thus only to examine this list in order to ascertain his idea of the extent of the genus. They are the following, taking them in the order in which they are published:—

"*S. Ceres, vultur, Circe, passer, Herculea, harpya, Hecate, tumida, concentrica, Helmerseni, Puschana, decussata, plebeia, Ferronesensis, Ezquerra, Hispanica, Toreno, subconcentrica, Pelapayensis, Campomanensis, Mayendorfi, Roissy, serpentina, lamellosa, ambigua, Blodena, plano-sulcata, expansa, pentaëdra, pectinifera, trigonella, quinquecostata, quadricostata, tricostata, and cristigalli.*"

Several of the above species do not belong to the group. This list shows that D'Orbigny regarded the genus as including not only the types of *Athyris* and *Spirigera*, but also that of the genus *Merista* (*M. Herculea*), which I shall notice further on. I think it quite certain that, had D'Orbigny been aware that the genus was capable of subdivision, he would have retained *Athyris* for one of the groups which have the beak imperforate. Indeed, according to the laws of nomenclature, he could not have done otherwise with any probability of producing a permanent classification.

In a valuable paper, read before the Geological Society of France, in May 1848, on the Brachiopoda of the Upper Silurian rocks of England †, Mr. Davidson made the following observations on D'Orbigny's genus:—

"Vient ensuite le genre *Spirigera* que le même auteur établit pour les coquilles qui possèdent des spires internes placées de la même manière que les *Spirifer*, mais qui ont des appendices et des détails d'organisation essentiellement différents. Ces espèces, parmi lesquelles nous trouvons les *Terebratula, tumida, Circe, concentrica, subconcentrica, Roissy, pectinifera, ambigua, Helmerseni, Pelapayensis, Campomanensis, Ferronesensis, Ezquerra, Hispanica*, ont déjà été distinguées par M. de Verneuil comme devant former une section à part, qu'il a nommée la section des *Concentrica*. Je suis de l'opinion de M. d'Orbigny qu'elles doivent constituer un genre. L'étude minutieuse que M. Bouchard a faite de la *Terebratula concentrica* ne m'en laisse aucun doute; mais ce genre n'ayant pas encore été convenablement caractérisé, je m'abstiendrai de l'adopter

* "Le type est *T. concentrica*, De Buch. Toutes les espèces avec leur synonymie se trouvent dans notre 'Prodrome de Paléontologie stratigraphique.'"

† "Mémoire sur les Brachiopodes du Système Silurien supérieur d'Angleterre, par M. Th. Davidson," Bull. Soc. Géol. Fr. v. pp. 309–314.

dans ce petit mémoire qui n'est pour ainsi dire qu'un résumé d'un plus grand travail que je publie en ce moment dans le *London Geological Journal*."

Upon the above I shall only remark that it is quite clear that Mr. Davidson then regarded *S. concentrica* and *A. tumida* as congeneric, and that whatever new genus might be established it would include both species.

In 1852, M'Coy, in the second fasciculus of the 'British Palæozoic Fossils,' page 196, redefined *Athyris* as follows:—

"*Gen. Char.*—Nearly orbicular or ovate, both valves convex; no cardinal area, foramen, or hinge-line; spiral appendages to beak of entering valve very large, nearly filling the shell; a strong mesial septum in the rostral part of entering valve; dental lamellæ moderate; tissue of shell apparently fibrous.

"One specimen [of *A. tumida*] shows the pallial and ovarian impressions to be thick, numerous, and dichotomizing frequently from beak to margin."

In the work cited and in the third fasciculus we find the following species:—*A. tumida*, *S. concentrica*, *ambigua*, *De Roissyi*, *expansa*, *globistriata*, *globularis*, *gregaria*, *paradoxa*, *pectinifera*, and *squamigera*. This shows clearly enough his views of the extent of the genus—that is to say, that, as it was then understood, it included both *A. tumida* and *A. concentrica*. In commenting on this, Prof. Hall says:—"The fact that M'Coy cited this as an *Athyris* no more renders it an *Athyris* than it was made *Atrypa* by being thus described by Dalman; and it was just as free for the foundation of a genus after the citation of M'Coy as before"*. This is true enough in part. It was free for the foundation of a genus until 1853, when Davidson used it for that purpose; but since 1853 it has never been free.

The above is quite sufficient to prove my first and second propositions.

I am not aware of anything else of much importance, with the exception of what relates to *Merista*, having been published up to 1853, when Davidson's excellent work, the 'Introduction to the Classification of the Brachiopoda,' made its appearance, in which the genus was first subdivided. But, before entering upon this, I shall notice the remarks of Prof. Suess on the genus *Merista*.

This genus was proposed by Prof. Suess in 1851; but he did not then sufficiently characterize it. The following is all that I can find relating to it that was published previously to 1853:—

"Mr. E. Suess communicated the results of the investigations on several Brachiopods, from the Bohemian transition rocks, which had

* Silliman's Journal, ser. 2. vol. xxxii. p. 131.

been made by him and Mr. Custos Dormitzer, of Prague. He showed that some of the forms heretofore referred to *Terebratula* had no opening in the beak for the passage of the muscle of adhesion, and also that the distribution of their inner organs points to an affinity with the non-attached genus *Pentamerus*. These inner organs are borne by six partitions in place of a single calcareous loop; the spiral arms are not unrollable.

“Through the separation of these forms (for which the name *Merista* is proposed) from the genus *Terebratula*, an apparent contradiction in the laws of palæontological distribution is solved, since those smooth forms will now be separated which have heretofore offered an apparent contradiction to the present views of these laws.”

Lest I should not have expressed his views rightly in this free translation, I give the original in the note below*.

On page 160 of the same work there are some further remarks on the classification of the Brachiopoda, by Prof. Suess, in which he refers to the genus *Merista*. No generic description, however, is there given. It appears also that it was again noticed in Leonhard's 'Neues Jahrbuch,' 1854, p. 127. I have not at present access to that work, and do not know whether the genus is described there or not: at all events, at the time Mr. Davidson prepared the English edition of his 'General Introduction,' *Merista* was not understood.

Prof. King, in his 'Monograph of the Permian Fossils of England' (1850), proposed to restore the genus *Cleiothyris* of Phillips, apparently making it partly equal to *Athyris*, M'Coy. But the specimen on which this arrangement was founded was afterwards shown to Mr. Davidson, and by him identified with *T. scalprum*, Barrande (now *Merista scalprum*), while *Cleiothyris* was intended by its author as a substitute for *Atrypa*. (See Davidson's 'Introduction,' p. 85.)

* “Herr Eduard Suess theilte die Erfolge der Untersuchung einiger Brachiopoden aus dem böhmischen Uebergangsgebirge mit, die er gemeinschaftlich mit Herrn Custos Dormitzer in Prag angestellt hatte. Er zeigte, dass mehrere bisher zu den Terebrateln gezählte Formen an ihrer Spitze keine Oeffnung für den Anheftungsmuskel besitzen, und dass auch die Vertheilung ihrer inneren Organe auf eine Verwandtschaft mit der ebenfalls nicht angehefteten Gattung *Pentamerus* hinweist. Diese inneren Organe werden von 6 Wänden, statt von einer einfachen Kalkschleife getragen; die Spiralarmselbst sind nicht aufrollbar.

“Durch das Lostrennen dieser Formen, für welche der Name *Merista* vorgeschlagen wird, von der Gattung *Terebratula*, wird zugleich ein scheinbarer Widerspruch in den Gesetzen paläontologischer Verbreitung gehoben, da eben jene glatten Arten ausgeschieden werden, welche den bisherigen Ansichten über diese Gesetze am schroffsten entgegengestanden waren.”—*Jahrbuch der k. k. geologischen Reichsanstalt, Vienna*, ii. pt. 4. pp. 150, 160: 1861.

2. *Subdivision of the Genus by Mr. Davidson in 1854.*

From all the facts above given it may be gleaned that in 1853, when Mr. Davidson was engaged in the preparation of his 'General Introduction,' this group of Brachiopoda was known as a single genus, but with two generic names—*Athyris*, M'Coy, 1844, *Spirigera*, D'Orbigny, 1847. Each of these was intended by its author to include the whole group. M'Coy was under the impression that all the species had the beak imperforate, while D'Orbigny maintained that they were all perforated. Both authors were partly wrong and partly right. The genus was capable of subdivision; but no one had as yet undertaken that task, unless, indeed, the observations of Prof. King and Suess can be so construed. With regard to the latter, as the genus *Merista* is now well understood and is different from *Athyris*, it does not affect the question. *Cleiothyris* may be regarded as obsolete.

Mr. Davidson, in his 'General Introduction,' in endeavouring to reconcile the conflicting nomenclatures of D'Orbigny and M'Coy, divided the genus, retaining the name *Athyris* for "forms with an apparently imperforate beak or closed foramen, variously disposed septa, and largely developed dental plates." He selected two species, "*A. tumida*, Dal., or *Herculea*, Barande," and specially named them as the types.

He retained *Spirigera* for the group of which *S. concentrica* is the type. As to this latter group, by whatever name it may be hereafter known, its extent will most probably always be that assigned to it in the work in question.

The genus *Athyris*, however, as there defined, included *Merista*—a circumstance which, however, as I shall presently show, in no way vitiates the arrangement. In a note he states, "Before coming to the above conclusion, I submitted my views to Mr. Deshayes, Mr. Salter, and others, who seemed to consider that this mode of compromising the difficulty could not reasonably be objected to by the two authors principally concerned, nor by the generality of palæontologists" (*op. cit.* p. 86).

Afterwards this classification was strongly objected to by several naturalists, who maintained that M'Coy had "originally and positively" applied the name *Athyris* to the *S. concentrica* group, and therefore it could not be transferred to the other principal section. He, therefore, in the French edition of this introduction (1856), abandoned his first arrangement*, and

* "Mais ce moyen terme a été critiqué par plusieurs naturalistes qui ont insisté sur ce que le terme *Athyris* avait été originairement et positivement appliqué par son auteur à la *T. concentrica* et sur l'impropriété de l'autre dénomination pour désigner des coquilles telles que les *T. tumida*, *Herculea*, &c. M. Suess nous a informé (*Neues Jahrbuch*, p. 62, Janvier

substituted *Merista* and *Athyris*, at the same time transferring the latter to *Spirigera*, as in the extract given in the note below (*op. cit.* p. 101).

Upon a careful examination of all the circumstances, I think it will be found that, according to the laws of nomenclature, this change cannot be sustained. I shall therefore quote some of those laws, and endeavour to apply them to this case.

The first rule reads thus:—

“ § 1.—The name originally given by the founder of a group or the describer of a species should be permanently retained, to the exclusion of all subsequent synonyms.”

It seems scarcely necessary to quote such a rule as this. I only do so in order to make the comment that it is the most important of all the laws of nomenclature, and that its operation cannot be prevented in any case by merely technical objections or by any error in the details of a generic or specific description. Provided the original diagnosis contains sufficient in substance to enable the scientific public to identify the group, trivial errors, from which the writings of no naturalist are free, will not have any effect. All that can be done is to rectify, not to destroy. One of the exceptions to this rule is thus expressed in No. 11:—“ A name may be changed when it implies a false proposition which is likely to propagate important errors.”

According to this exception, if the name *Athyris* should be applied to the *S. concentrica* group, there is a possibility of its falling into the list of synonyms; for, although no very important error would be superinduced, yet few naturalists can apply it to shells with a well-defined foramen without feeling that such an application is to some extent inconsistent with the purity of scientific nomenclature.

“ § 3.—A generic name, when once established, should never be cancelled in any subsequent subdivision of the group, but retained in a restricted sense for one of the constituent portions.

“ § 4. A generic name should always be retained for that portion of the original genus which was considered typical by the author.”

This latter rule is preceded by some introductory observations which should be embodied in it, as they, in fact, form a

1854) qu'il avait, en 1851, proposé le nom de *Merista* (Jahrb. k. k. geol. Reichsanstalt, ii. iv. 150, 1851. Mentionné encore dans *Leonhard's Neues Jahrbuch*, p. 127, 1854) pour le groupe renfermant ces dernières. J'abandonne donc la proposition que j'avais faite en 1853, et je conserve indifféremment l'*Athyris*, M'Coy, ou le *Spirigera*, d'Orb., pour le *T. concentrica*; et *Merista*, Suess, pour les *T. tumida*, *Herculea*, etc.”

part of the rule itself. They are especially applicable to this case.

“When a genus is subdivided into other genera, the original name should be retained for that portion of it *as at first defined*. Authors frequently indicate this by selecting some one species as a fixed point of reference, which they term the ‘type of the genus.’ When they omit doing so, it may still in many cases be justly inferred that the *first* species mentioned on the list, *if found accurately to agree with their definition*, was regarded by them as the type. A specific name, or its synonyms, will also often serve to point out the particular species which by implication must be regarded as the original type of the genus. In such cases we are justified in restoring the name of the old genus to its typical signification, even when later authors have done otherwise.”

Now this rule bears directly on the question, because many naturalists are under the impression that the first species placed on the list must *necessarily* be regarded as the type where the author is silent on that point. But, according to the above (and common sense), it is only so if found *accurately to agree with the definition*. *Spirigera concentrica* does not agree either with the name *Athyris*, or with M‘Coy’s generic description, or with his typical figure. Therefore it cannot be arbitrarily selected as the type, and the name *Athyris*, in consequence, retained for that group. Indeed in many instances it would be impossible that the first species placed in the genus should be the type; for the author might not have the true type in the collection under investigation.

In this instance, as before mentioned, M‘Coy was preparing a work exclusively devoted to Carboniferous fossils, among which *A. tumida* does not occur. In preparing his description of the genus he may, however, have had that species before him, and its imperforate beak may have had some influence.

“§ 5. When the evidence as to the original type is not clear and indisputable, then the person who first subdivides the genus may affix the original name to any portion of it at his discretion; *and no later author has a right to transfer that name to any other part of the original genus.*”

This last paragraph applies as well to the author who first subdivided the genus as to others. Once a genus is established or subdivided, on sound principles, it becomes the property of science, and the author himself (either of the genus or the subdivision) can make no change. He may amend, by striking out the errors, if any there be, but all that is true must remain.

I think that, on a careful study of all the circumstances, it will be perceived that Mr. Davidson’s first adjustment of this

question was the most wise, the best for the interests of science, and the most just towards all the parties concerned that could be devised. It was not inconsistent with the laws of nomenclature, but in perfect accordance with them in every particular, and therefore should be retained.

In one respect, however, it has been modified. *Athyris*, as first defined by him, included *Merista* of Prof. Suess. This was, no doubt, due to the fact that the characters of this last-named genus were not then accurately known to the scientific public. This makes little difference. *Merista* has long since been separated, with its type *M. Herculea*, leaving the other and most important group for *Athyris*, with *A. tumida* for the type.

With regard to *Spirigera*, I think it can also be retained, notwithstanding the following rule:—

“§ When two authors define and name the same genus, *both making it exactly of the same extent*, the latter name should be cancelled *in toto*, and not retained in a modified sense.”

If the name *Athyris* had been extremely objectionable, according to the 11th rule, *Spirigera* might have cancelled it altogether. But the true principle of interpreting these laws is, that where there is any possibility at all of saving the original name, it must be saved, even if the rules be strained to their utmost in that direction. The rules cannot be stretched to destroy, but they may be strongly bent in the other direction, to preserve. If a generic name should be appropriate for a large number of the species of the group to which it was originally applied, and *not very* objectionable as to a few only, I doubt whether it can be changed. Such was the case with *Athyris* when D'Orbigny objected to it. More than two-thirds of the species designated by him are imperforate, and he should have retained the name for these. Some naturalists were therefore in favour of rejecting *Spirigera* altogether, others of retaining it. It is not, therefore, a case clearly within the rule; and as there was much doubt, the best course to take, as soon as it was found possible to do so, was taken by Mr. Davidson. He decided in favour of preserving the name.

3. *Authors who have adopted the Classification.*

In 1856, Professors H. G. Bronn and F. Roemer, in the third edition of Bronn's 'Lethæa Geognostica,' adopted Davidson's classification, and copied his diagnosis of both genera in full. They cited *A. tumida* as the type of *Athyris*. "Die typische Art ist *Athyris tumida*, M'Coy (*Atrypa tumida*, Dalman). Andere Arten sind *A. Herculea* (*Terebratula Herculea*, Barrande),

A. pseudo-scalprum (*Terebratula pseudo-scalprum*, Barrande), *A. scalprum* (*Terebratula scalprum*, Fried. Roemer)" (*op. cit.* p. 331).

They also recognized *S. concentrica* as the type of *Spirigera*. "Die typische Art ist *Sp. concentrica* (*Terebratula concentrica*, Bronn). Andere Arten sind *Sp. pectinifera* (*Atrypa pectinifera*, Sowerby), aus dem Zechstein, *Sp. Roissyi* (*Sp. de Roissy*, Leveillé)," &c. (*op. cit.* p. 332).

In the same year Eichwald placed *A. tumida* in *Athyris*, and *S. concentrica* in *Spirigera**.

In 1860 he also introduced the same classification in his great work on the Palæontology of Russia. The Russian species are *A. tumida*, *didyma*, *ungula*, *cassidea*, *S. concentrica* and *ambigua*†.

In my studies of the Canadian Brachiopoda I had no occasion to describe any species of this group until 1859, when I commenced a series of papers on the Devonian Fossils of Canada West. At that time I had not fully investigated the subject, but understood, from a paper published by Mr. Davidson in the 'Geologist' (vol. i. p. 456), and also from Woodward's 'Manual of the Mollusca' (p. 223), that *A. tumida* and *S. concentrica* were thought to be inseparable‡. Not feeling perfectly satisfied that this was the correct classification, I prefaced my descriptions with the following remarks:—

"GENUS *ATHYRIS*, M'COY.

"There is much difference of opinion as to the propriety of retaining this generic name. It implies that the shells have no foramen in the ventral valve; and yet many are placed in the genus which have the beak distinctly perforated. Some palæontologists are therefore in favour of using D'Orbigny's appellation *Spirigera* instead of *Athyris*. Nearly all of the Silurian species, and some of those from the Devonian rocks, have the beak so strongly incurved that no foramen can be seen. For such, at least, the name *Athyris* does not appear to be very inappropriate. Mr. Davidson still retains it, not only for those which have the foramen concealed, but also for those with it open. It appears probable that the genus will sooner or later be subdivided; and in that case *Athyris* might be retained for the species with closely incurved beak, and *Spirigera* for some of the others. I shall give some account of the generic characters of this group of shells in another article. The following species are placed in the genus provisionally."—*Canadian Journal*, ser. 2. vol. v. p. 273 (May 1860).

In that paper I described two species with closed beaks (*A.*

* "Beitrag zur geographischen Verbreitung der fossilen Thiere Russlands," Bull. Soc. Imp. Nat. Moscou, vol. xxix. pp. 419, 422.

† *Lethæa Rossica*, vol. ii. p. 731 (*Athyris*), p. 735 (*Spirigera*).

‡ In this work Mr. Woodward separates *Merista* (although with doubt) as a subgenus, and refers *A. tumida* to *Athyris*.

clara and *A. Maia*) which, no doubt, belong to the genus. The others with perforated beaks I marked doubtful, thus:—*A. (?) scitula* (Hall); *A. (?) Chusia*, n. sp.; *A. (?) unisulcata* (Conrad); *A. (?) rostrata* (Hall); *A. (?) Chloë*, n. sp.*

“I think it the same as the species called *Meristella Doris* by Prof. Hall (13th Reg. Rep. p. 84, 1860). I doubt that any of the others belong to either *Athyris* or *Spirigera*.”

Afterwards Prof. Hall (13th Reg. Rep. p. 74) proposed to establish a new genus, *Meristella*, precisely identical with *Athyris* as redefined by McCoy in 1852. His diagnosis reads thus:—

“Shells variable in form, oval, ovoid, orbicular, or transverse. Valves unequally convex, with or without a median fold and sinus; beak of the ventral valve apparently imperforate, incurved over the beak of the smaller valve; area none; valves articulating by teeth and sockets. Surface smooth, or with fine concentric lines of growth and fine obsolete radiating striæ, which are usually more conspicuous in the exfoliated shell. The interior of the dorsal valve is marked by the presence of the longitudinal septum, and the upper part of the ventral valve by a deep subtriangular muscular impression which unites with the rostral cavity.”

Now I hold that, instead of proposing a new genus, he should have retained the original name *Athyris*, because his proposition amounts to a subdivision of the group: and, according to the laws of nomenclature, he should have applied the old name to that portion for which it is most appropriate, as had been done six years before by Davidson. As soon as this new arrangement was published, I reinvestigated the subject, and perceiving that it amounted to nothing more than a restoration of Davidson's former classification, but with a change of names, I declined to adopt it. In all the publications of our Survey in which species of this group are described or figured, *Athyris* is used instead of *Meristella*.

On the merits of this classification, a note in ‘Silliman's

* I now think that *A. clara* is the same as Prof. Hall's *Meristella nasuta*, but am not quite sure that it is Conrad's species. *A. (?) scitula* was afterwards found to belong to a new genus described by me under the name of *Charionella* (*op. cit.* vol. vi. p. 148, March 1861). It is not *Atrypa scitula*, Hall, a point on which I was not certain at the time, as will be seen by the description, which reads thus:—

“The above figures represent different views of two specimens of a species which appears to me to be identical with that figured in the work above cited. It varies greatly in size. The length of the largest specimen that I have seen is 17 lines, the greatest width 14 lines, depth 8 lines. The smallest is about 2 lines in length; and many of intermediate sizes have been observed, to make out the series. It is not certain that this species belongs to the genus *Athyris*.”—*Op. cit.* p. 30.

Journal,' ser. 2. vol. xxxiii. p. 130, expresses the views advocated herein. The following is an extract therefrom:—

“This is the classification which the writer of the criticism maintains should be sustained; and we cannot see any reasonable objection to it. It is perfectly just towards both M'Coy and D'Orbigny. It inflicts no injustice on any other author. It is not inconsistent with purity of zoological nomenclature, or in any way injurious to science. It does not require any modification in either of the original definitions. The typical species are central and dominant forms of two different groups of species which together form one larger general group. *Athyris*, under this arrangement, is the generic name of that group which has *A. tumida* for its type. *Spirigera* is a perfectly unexceptionable name for the other group, of which the typical form is *S. concentrica*. Prof. Hall's proposed genus *Meristella* is precisely identical with the genus *Athyris* in its restricted sense (as above explained), and cannot be admitted until some good reason is shown for setting aside Davidson's arrangement. It belongs to Prof. Hall to place this reason before the public in a clear and unsophisticated manner. If he succeed in maintaining his point, then he will establish a classification for this group of fossils far inferior to that proposed by Davidson. *Spirigera* must be suppressed, and *Athyris* must take its place, and thus stand as the generic appellation of a group of fossils for which it is not appropriate. We hold that this change is not necessary; and as it would, if adopted, be injurious to science by affecting the purity of zoological nomenclature, it cannot be maintained.”

XXX.—*Fourth Report on Dredging among the Shetland Isles.*

By J. GWYN JEFFREYS, F.R.S.*

IN spite of the weather (which was worse than usual in this stormy region), some additional results of no slight interest were obtained. The three requisites of such enterprises (time, money, and experience) were not wanting; and the valuable co-operation of Mr. Norman, Mr. Waller, and Mr. Dodd, aided by a good yacht and crew, and by a large stock of apparatus, left nothing to desire except calmer seas. Dr. Edmonston and his family again did all in their power to promote our endeavours; and Mr. Cheyne of Edinburgh kindly placed his house at Tanwick at our disposal.

Discoveries in natural history are of several kinds, all of which are nearly equally important:—1. New species or forms. 2. Geographical distribution. 3. Habits of animals, including in the present case those supposed to be dependent on the depth of water. 4. Geological relations. 5. Extraneous incidents.

* Communicated by the author, having been read at the Meeting of the British Association at Dundee, 5th Sept., 1867.